

## ABSTRACT

An effective contrast agent for use in MRI-based methods for directly determining tissue oxygenation in a subject using MRI equipment as well as methods for assessing tissue oxygenation were discovered. Methods employ a blood substitute bound to a water soluble polymer as an MRI contrast agent. In the experiments described herein, polyethylene glycol (PEG) derivatives of bovine hemoglobin (pegylated Hb or PEG-Hb) were used as the contrast agent.